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CALLBACK PROCESSING SYSTEM  
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[Claim 1] A callback processing system for a communication system in which a plurality of private branch exchanges connected by lease lines make connections with mobile units by means of a public network, according to which callback processing system a private branch exchange, when an internal telephone of its own station receives an incoming call from a mobile unit through a public network by a dial-in process, stores the subscriber number of the aforesaid mobile unit and the information regarding its caller-side base station and terminates the call if the internal telephone is busy and also calls back the aforesaid mobile unit via the private branch exchange nearest to the aforesaid caller-side base station after the aforesaid busy status is over.

[Claim 2] A callback processing system for a communication system in which a plurality of private branch exchanges connected by lease lines make a connection with mobile units by means of a public network, according to which callback processing system a private branch exchange, when a specified internal telephone of its own station receives an incoming call from a mobile unit through a public network by a dial-in process, stores the subscriber number of the aforesaid mobile unit and the information regarding its caller-side base station and terminates the call and also calls back the aforesaid mobile unit

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via the private branch exchange nearest to the aforesaid caller-side base station.

[Claim 3] The callback processing system stated in Claim 1, wherein, for each dial-in number, the private branch exchange can register in advance the processing method of a call received while the receiving side is busy and processes the call received while the receiving side is busy according to the aforesaid registered content.

[Claim 4] The callback processing system stated in Claim 2, wherein, for each dial-in number, the private branch exchange can register in advance the processing method of a call to the specified internal telephone and processes the call to the specified internal telephone according to the aforesaid registered content.

[Claim 5] The callback processing system stated in Claim 1, wherein the private branch exchange gives guidance with respect to the processing method of a call received while the receiving side is busy to the originator of said call and processes the call according to the instruction input by the call-originator.

[Claim 6] The callback processing system stated in Claim 2, wherein the private branch exchange gives guidance with respect to the processing method of a call made to the specified internal telephone to the originator of said call and processes the call according to the instruction input by the call-originator.

[Claim 7] The callback processing system stated in Claim 1, wherein, when a call is received while the receiving side is busy, the

private branch exchange evaluates the calling-rate-determining distance between the base station of the call-originating side and its own station or the private branch exchange nearest to said base station and determines the method of processing the aforesaid call according to the result of this evaluation.

[Claim 8] The callback processing system stated in Claim 2, wherein, when the specified internal telephone receives a call, the private branch exchange evaluates the calling-rate-determining distance between the base station of the call-originating side and its own station or the private branch exchange nearest to said base station and determines the method of processing the aforesaid call according to the result of this evaluation.

[Claim 9] The callback processing system stated in Claim 1, wherein, when a call is received while the receiving side is busy, the private branch exchange evaluates if the subscriber number of the call-originating mobile unit is a pre-approved subscriber number or not and determines the method of processing the aforesaid call according to the result of this evaluation.

[Claim 10] The callback processing system stated in Claim 2, wherein, when the specified internal telephone receives a call, the private branch exchange evaluates if the subscriber number of the call-originating mobile unit is a pre-approved subscriber number or not and determines the method of processing the aforesaid call according to the result of this evaluation.

[Claim 11] The callback processing system stated in Claim 1, wherein, when a call is received while the receiving side is busy, the private branch exchange requests the originator of said call to input his/her ID number, evaluates if the input ID number is a pre-approved ID number or not, and determines the method of processing the aforesaid call according to the result of this evaluation.

[Claim 12] The callback processing system stated in Claim 2, wherein, when the specified internal telephone receives a call, the private branch exchange requests the originator of said call to input his/her ID number, evaluates if the input ID number is a pre-approved ID number or not, and determines the method of processing the aforesaid call according to the result of this evaluation.

[Claim 13] The callback processing system stated in Claims 1 and 2, wherein, when an incoming call is received from a mobile unit, the private branch exchange requests the originator of said call to input the subscriber number if the public network side does not provide the subscriber number of said mobile unit and calls back using the input subscriber number.

[Claim 14] The callback processing system stated in Claims 1 and 2, wherein, based on given positional information provided from a mobile unit upon receiving an incoming call from the mobile unit, the private branch exchange determines the private branch exchange nearest to the caller-side base station of the mobile unit.

[Claim 15] The callback processing system stated in Claims 1 and 2, wherein, based on the positional information that is provided from a mobile unit upon receiving an incoming call from the mobile unit and that is measured by a global positioning system, the private branch exchange determines the private branch exchange nearest to the caller-side base station of the mobile unit.

[Detailed Description of the Invention]

[0001] [Technical Field of the Invention]

The present invention pertains to a callback processing system. More specifically, it pertains to a callback processing system for communication systems in which a plurality of private branch exchanges connected by lease lines make connections with mobile units by means of public networks. Since mobile units, such as automobile phones, cell phones, PHSS, etc., have become common in recent years, it is desirable to be able to make a call not only back to incoming calls from land phones but also to incoming calls from mobile units.

[0002] [Prior Art]

In the past, there has been an idea of using "connection of public telephone networks with internal private circuit (one's own lease line)" when making a callback to an incoming call from land phones. If a callback is made using "connection of public telephone networks with internal private circuit", without using public networks, the calling rate for this zone can be reduced.

[0003] [Problems that the Invention Intends to Solve]

However, in the case of receiving an incoming call from a mobile unit, such as a cell phone or PHS, its originating location cannot be determined from the telephone number of the mobile unit; as a result, /3 efficient callback processing cannot be executed. The objective of the present invention is to provide a callback processing system that makes it possible to execute efficient callback processing for incoming calls from mobile units.

[0004] [Means of Solving the Problems]

The aforesaid objective can be achieved, for example, by the configuration shown in Fig. 1. That is, the callback processing system according to the first aspect of the present invention (1) is a callback processing system for a communication system in which a plurality of private branch exchanges (4, 6) connected by lease lines (5) make a connection with mobile units (1) by means of a public network (3), according to which callback processing system a private branch exchange (6), when an internal telephone (7) of its own station receives an incoming call from a mobile unit (1) through a public network (3) by a dial-in process, stores the subscriber number of the aforesaid mobile unit (1) and the information regarding its caller-side base station (2) and terminates the call if the internal telephone (7) is busy and also calls back the aforesaid mobile unit (1) via the private branch exchange (4) nearest to the aforesaid caller-side base station (2) after the aforesaid busy status is over.



[0005] According to the first invention (1), because the private branch exchange (6) stores the information of the caller-side base station (2) of the mobile unit (1) when the call is received from the mobile unit (1) while the receiving side is busy, even in the case of calling the mobile unit (1) back after the call on the internal telephone (7) is completed, the location of the mobile unit (1) can be determined. After the busy status of the internal telephone (7) is over, the aforesaid mobile unit (1) is called back via the private branch exchange (4) nearest to the caller-side base station (2); as a result, the calling fee charged to the caller incurred by this callback can be reduced, and the calling fee for the section corresponding to the lease line (5) can also be saved, which reduces the calling fee charged to the private branch exchange (6).

[0006] The callback processing system according to the second aspect of the present invention (2) is a callback processing system for a communication system in which a plurality of private branch exchanges (4, 6) connected by lease lines (5) make a connection with mobile units (1) by means of a public networks(3), according to which callback processing system a private branch exchange (6), when a specified internal telephone (7) of its own station receives an incoming call from a mobile unit (1) through a public network (3) by a dial-in process, stores the subscriber number of the aforesaid mobile unit (1) and the information regarding its caller-side base station (2) and terminates the call and also calls back the aforesaid mobile

unit (1) via the private branch exchange (4) nearest to the aforesaid caller-side base station (2).

[0007] According to the second invention (2), because the private branch exchange (6) carries out a callback process for the specified internal telephone (7), the caller of the mobile unit (1) who is informed to this effect can receive a callback automatically by calling the specified internal telephone (7); thus, the caller can make a call without incurring any calling charge, and the calling fee charged to the private branch exchange (6) can also be reduced.

[0008] According to the third aspect of the present invention (3), it is preferable that, in the aforesaid first invention (1), the private branch exchange (6) can register in advance, for each dial-in number, the processing method of a call received while the receiving side is busy and processes the call received while the receiving side is busy according to the aforesaid registered content. For example, a given internal telephone is set so that a call received while the receiving side is busy undergoes a receiving-side-busy process, while another internal telephone is set so that a call received while the receiving side is busy undergoes a callback process. Because the processing method for a call received while the receiving side is busy can be selected in advance for each internal telephone, the system of the present invention can facilitate various applications of the internal telephones.

[0009] According to the fourth aspect of the present invention (4), it is preferable that, in the aforesaid second invention (2), the private branch exchange (6) can register in advance, for each dial-in number, the processing method of a call to a specified internal telephone (7) and processes the call to a specified internal telephone (7) according to the aforesaid registered content. For example, for a specified internal telephone, an incoming call is connected directly, while, for another internal telephone, an incoming call undergoes a callback process unconditionally. As a result, the system of this invention can facilitate establishing internal telephones exclusive for callback use.

[0010] According to the fifth aspect of the present invention (5), it is preferable that, in the aforesaid first invention (1), the private branch exchange (6) give guidance with respect to the processing method of a call received while the receiving side is busy to the originator of said call and process the call according to the instruction input by the call-originator. For example, if the caller requests a callback in response to the busy status of the receiving side, the caller is called back after the busy status is over, and, if the caller does not request a callback, said incoming call is subjected to a receiving-side-busy process and terminated. Thus, the system of the present invention makes it possible for the caller to select whether to receive a callback or not depending on the

urgency/importance of the call, distance, etc., thereby facilitating the ease of use.

[0011] According to the sixth aspect of the present invention (6), it is preferable that, in the aforesaid second invention (2), the private branch exchange (6) give guidance with respect to the processing method of a call made to a specified internal telephone to the originator of said call and process the call according to the instruction input by the call-originator. For example, if the caller requests a callback, the caller is called back immediately from the private branch exchange (6) side, and, if the caller does not request a callback, said incoming call is directly connected. Thus, the system of the present invention makes it possible for the caller to select whether to receive a callback or not depending on the urgency/importance of the call, long call/short call, etc., thereby facilitating the ease of use.

[0012] According to the seventh aspect of the present invention (7), it is preferable that, in the aforesaid first invention (1), when a call is received while the receiving side is busy, the private branch exchange (6) evaluate the calling-rate-determining distance between the base station (2) of the call-originating side and its own station (6) or the private branch exchange (4) nearest to said base station (2) and determine the method of processing the aforesaid call according to the result of this evaluation. For example, if the caller-side base station (2) and its own station (6) are close, the

caller does not bear much charge; therefore, the call is terminated in response to the busy state, and the caller calls again later. If they are far away, a callback is made via the private branch exchange (4) nearest to the base station (2) so as to reduce the charge born by the caller. If the caller-side base station (2) and the private branch exchange (4) are close, a callback process is selected because the caller's charge can be reduced. If the caller-side base station (2) is far from both private branch exchanges (4, 6), there is little merit in calling back; therefore, the call is terminated in response to the busy state. Since the private branch exchange (6) determines whether to execute a callback process or not, the caller can obtain the /4 advantage of reducing the calling charge simply by following this.

[0013] According to the eighth aspect of the present invention (8), it is preferable that, in the aforesaid second invention (2), when the specified internal telephone receives a call, the private branch exchange (6) evaluate the calling-rate-determining distance between the base station (2) of the call-originating side and its own station (6) or the private branch exchange (4) nearest to said base station (2) and determine the method of processing the aforesaid call according to the result of this evaluation. For example, if the caller-side base station (2) and its own station (6) are close, the caller does not bear much charge; therefore, the call is connected directly, and the objective is attained. If they are far away, a callback is made via the private branch exchange (4) nearest to the

base station (2) so as to reduce the charge born by the caller. If the caller-side base station (2) and the private branch exchange (4) are close, a callback process is selected because the caller's charge can be reduced, and, if the caller-side base station (2) is far from both private branch exchanges (4, 6), there is little merit in calling back; therefore, the call is directly connected. Thus, the system of the present invention can effect efficient communication service.

[0014] According to the ninth aspect of the present invention (9), it is preferable that, in the aforesaid first invention (1), when a call is received while the receiving side is busy, the private branch exchange (6) evaluate if the subscriber number of the call-originating mobile unit (1) is a pre-approved subscriber number or not and determine the method of processing the aforesaid call according to the result of this evaluation. For example, if the subscriber number of the mobile unit (1) is not a pre-approved subscriber number, it is not necessary to give a callback benefit to the caller; therefore, said call is processed in response to the busy state of the receiving side. If the subscriber number is a pre-approved subscriber number, a callback process is selected. In this manner, callback service can be provided only to specific subscribers. In addition, since the subscriber number is used for the detection, there is no operation that the caller is required to perform.

[0015] According to the tenth aspect of the present invention (10), it is preferable that, in the aforesaid second invention (2),

when the specified internal telephone (7) receives a call, the private branch exchange (6) evaluate if the subscriber number of the call-originating mobile unit (1) is a pre-approved subscriber number or not and determine the method of processing the aforesaid call according to the result of this evaluation. For example, if the subscriber number of the mobile unit (1) is not a pre-approved subscriber number, it is not necessary to give a callback benefit to the caller; therefore, said call is connected directly. If the subscriber number is a pre-approved subscriber number, a callback process is selected so as to reduce the communication charge of the subscriber. In this manner, callback service can be provided only to specific subscribers.

[0016] According to the eleventh aspect of the present invention (11), it is preferable that, in the aforesaid first invention (1), when a call is received while the receiving side is busy, the private branch exchange (6) request the originator of said call to input his/her ID number, evaluate if the input ID number is a pre-approved ID number or not, and determine the method of processing the aforesaid call according to the result of this evaluation. For example, if the ID number of the caller is not a pre-approved ID number, it is not necessary to give a callback benefit to the caller; therefore, said call is processed in response to the busy state of the receiving side. If the ID number is a pre-approved ID number, a callback process is selected. The use of ID numbers for controlling the system facilitates the system management, such as data entry/deletion, etc.

[0017] According to the twelfth aspect of the present invention (12), it is preferable that, in the aforesaid second invention (2), when the specified internal telephone (7) receives a call, the private branch exchange (6) request the originator of said call to input his/her ID number, evaluate if the input ID number is a pre-approved ID number or not, and determine the method of processing the aforesaid call according to the result of this evaluation. For example, if the ID number of the caller is not a pre-approved ID number, it is not necessary to give a callback benefit to the caller; therefore, said call is connected directly. If the ID number is a pre-approved ID number, a callback process is selected. The use of ID numbers for controlling the system facilitates the system management, such as data entry/deletion, etc.

[0018] According to the thirteenth aspect of the present invention (13), it is preferable that, in the aforesaid invention (1) or (2), when an incoming call is received from a mobile unit (1), the private branch exchange (6) request the originator of said call to input the subscriber number if the public network (3) side does not provide the subscriber number of said mobile unit (1) and call back using the input subscriber number. Depending on the communication system, there may be a case in which the public network (3) side does not provide the subscriber number of said mobile unit (1). Even in this case, the present invention (13) makes it possible to provide callback service to the mobile unit (1) with a simple operation.



[0019] According to the fourteenth aspect of the present invention (14), it is preferable that, in the aforesaid invention (1) or (2), based on given positional information provided from a mobile unit (1) upon receiving an incoming call from the mobile unit (1), the private branch exchange (6) determine the private branch exchange (4) nearest to the caller-side base station (2) of the mobile unit (1). Depending on the communication system, there may be a case in which the public network (3) side does not provide the positional information of the caller-side base station (2). Even in this case, the present invention (13) makes it possible to provide callback service to the mobile unit (1) with a simple operation—for example, by inputting the postal code, the telephone prefix, or the geographic information, such as the prefecture, etc., of the place where the caller is present.

[0020] According to the fifteenth aspect of the present invention (15), it is preferable that, in the aforesaid invention (1) or (2), based on the positional information that is provided from a mobile unit (1) upon receiving an incoming call from the mobile unit (1) and measured by a global positioning system, the private branch exchange (6) determine the private branch exchange (4) nearest to the caller-side base station (2) of the mobile unit (1). Therefore, even if the caller does not have geographic information of the location where he/she is present, the position of the mobile unit (1), that is, the positional information of the caller-side base station (2), can be

easily provided by utilizing positioning means, such as a GPS, etc., that are becoming widely available, thereby making it possible to provide callback service to the mobile unit (1).

[0021] [Embodiments of the Invention]

The following explains preferred embodiments of the present invention in detail, referring to the attached drawings. Fig. 2 is a drawing illustrating the configuration of the callback processing system according to an embodiment. In the figure, reference numeral 1 indicates a mobile unit, such as an automobile telephone, cell phone, PHS, etc.; 2, a base station that picks up the mobile unit by radio; 3, a public network including a mobile network; 4 and 6, private branch exchanges (PBX); 5, a lease line that connects the private branch exchanges; 7, an internal telephone; 8, a master unit of a cordless telephone that is connected to the internal line; and 9, a slave unit thereof. /5

[0022] In reference to the private branch exchange (6), reference numeral 61 is a callback processing section that executes the callback process pertaining to the present invention; 62, a control section that interfaces the controls (such as incoming call notification, connection request, etc.) between the private branch exchange (6) and the callback processing section (61) and also controls each component presented in the following; 63, a PB-signal analyzing section that receives and decodes PB signals (they could be MF signals between stations) from the caller (mobile unit 1) ; 64, a telephone-number

memory section that stores the telephone number of the caller and that, if necessary, checks to see if said telephone number is an approved number or not; 65, a positional-data analyzing section that, based on the positional data of the caller-side base station (2) and the location information of the private branch exchanges (4, 6, etc.), determines the private branch exchange (4) nearest to the caller-side base station (2); 66, a process-registration section that registers in advance the processing method of incoming calls in correspondence with dial-in numbers; 67, a voice-generating section for generating a voice guidance to the caller; and 68, an ID-number analyzing section that checks to see if the ID number of the caller is an approved number or not. The same applies to the private branch exchange (4).

[0023] Fig. 2 illustrates a configuration in which the callback processing functions pertaining to the present invention are fully implemented, but it goes without saying that a system need be equipped with only the functions that are necessary to its communication service. Here, this configuration is assumed to have a private branch exchange (6) located in the Tokyo area and a private branch exchange (4) in the Osaka area. The private branch exchanges (4, 6) are connected with, for example, one's own lease line, and each private branch exchange (4, 6) can be connected with a mobile unit (1) via a public network (3). That is, in response to dial-in from a mobile unit (1) of the public network, the private branch exchange (6) can call up a telephone (7), master unit (8), slave unit (9), etc., that are

connected to the internal line. Here, "by dial-in" means "with no human intervention (for example, by an operator, etc.)," and it does not matter what numbering system is used.

[0024] The following explains the callback process that is executed when a call from a mobile unit (1) is received by a telephone (7) (the same applies to a wireless telephone) of the private branch exchange (6) through a certain base station (2) located in the Osaka area and via the public network (3). Since the callback process pertaining to the present invention is executed by the private branch exchange (6) in this case, the private branch exchange (4) through which a callback call simply passes may be comprised of a common private branch exchange. It is, however, preferable for the private branch exchange (4) to have the same functions as the private branch exchange (6), as illustrated, from the standpoint of the symmetry of communications.

[0025] Figs. 3 through 18 are drawings (1) through (16) that explain the sequences of the callback processes according to the embodiments. Fig. 3 shows the process executed when the internal telephone (7) that is busy receives an incoming call from the mobile unit (1) by a dial-in process. At step S1, the control section (62) initializes the notification condition of the private branch exchange (6) in advance in such a way that the private branch exchange (6) informs the control section (62) both when an incoming call is

received while the internal telephone (7) is busy and when said internal telephone (7) becomes free after the call is finished.

[0026] When, in this state, an incoming call from the mobile unit (1) is received by the internal telephone (7) that is busy, this satisfies the aforesaid notification condition, and the private branch exchange (6) transmits a notification of the incoming call to the control section (62) at step S2. At step S3, the control section (62) requests the private branch exchange (6) to connect the call from the mobile unit (1) to the callback processing section (61), and, at step S4, the private branch exchange (6) connects the call from the mobile unit (1) to the callback processing section (61).

[0027] At step S5, the control section (62) stores in the telephone-number memory section (64) the subscriber number (contained, for example, in the call signal) of the mobile unit (1) provided from the public network (3). At step S6, the control section (62) causes the positional-information analyzing section (65) to analyze the positional information (contained, for example, in the call signal) of the base station (2). Furthermore, at step S7, the control section (62) activates the voice-generating section (67) to generate guidance that informs the caller that the receiving side is busy and prompts the caller to terminate the call and wait. Although not illustrated here, when the caller turns off the call button of the mobile unit (1), the call from the mobile unit (1) via the public network (3) is cut off.

[0028] When, in time, the call on the internal telephone (7) is completed, the private branch exchange (6) informs the control section (62) to that effect at step S8. In response to this, the control section (62) fetches the telephone number of the mobile unit (1) from the telephone-number memory section (64) at step S9 and fetches the positional-information analysis result [the prefix information, etc., of the private branch exchange (4) nearest to the caller-side base station (2)] from the positional-information analyzing section (65) at step S10.

[0029] Here, the private branch exchange nearest to the caller-side base station means, for example, a private branch exchange (4) that is located at the position that incurs the cheapest calling charge when the public network is used between it and the caller-side base station (2). The nearest private branch exchange (4) is selected based on whether the call from it becomes a local or long-distant call or, when it is a long-distant call, based on calling rate data, etc. At step S11, the control section (62) requests the private branch exchange (6) to call up the mobile unit (1) via the private branch exchange (4) selected as the result of the analysis and to connect it with the internal telephone (7). In response to this, the private branch exchange (6) calls up the mobile unit (1) through the private branch exchange (4) connected to the private branch exchange (6) via the lease line (5) and, at the same time, calls up the internal telephone (7), and, at step S12, it connects the mobile unit (1) and

the internal telephone (7) by means of "connection of public telephone networks with internal private circuit."

[0030] Fig. 4 illustrates the process that is executed when an incoming call is made to a specified internal telephone (7) from the mobile unit (1) by a dial-in process. At step S1, the control section (62) initializes the notification condition of the private branch exchange (6) in advance in such a way that, when a specified internal telephone (7) receives an incoming call, the private branch exchange (6) informs the control section (62) to that effect unconditionally.

[0031] When, in this state, an incoming call from the mobile unit (1) is received by the specified internal telephone (7), this satisfies the aforesaid notification condition, and the private branch exchange (6) transmits a notification of the incoming call to the control section (62) at step S2. At step S3, the control section (62) requests the private branch exchange (6) to connect the call from the mobile unit (1) to the callback processing section (61), and, at step S4, the private branch exchange (6) connects the call from the mobile unit (1) to the callback processing section (61).

[0032] At step S5, the control section (62) stores the subscriber number of the mobile unit (1) provided from the public network (3) in the telephone-number memory section (64). At step S6, the control section (62) causes the positional-information analyzing section (65) to analyze the positional information of the base station (2). Furthermore, at step S7, the control section (62) activates the

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voice-generating section (67) to generate guidance that prompts the caller to terminate the call and wait. Although not illustrated here, when the caller turns off the call button of the mobile unit, the call from the mobile unit via the public network (3) is cut off.

[0033] Subsequently, the control section (62) fetches the telephone number of the mobile unit (1) from the telephone-number memory section (64) at step S9 and fetches the positional-information analysis result [the prefix information, etc., of the private branch exchange (4) nearest to the caller-side base station (2)] from the positional-information analyzing section (65) at step S10. At step S11, the control section (62) requests the private branch exchange (6) to call up the mobile unit (1) via the private branch exchange (4) selected as the result of the analysis and to connect it with the internal telephone (7). In response to this, the private branch exchange (6) calls up the mobile unit (1) through the private branch exchange (4) connected to the private branch exchange (6) via the lease line (5) and, at the same time, calls up the internal telephone (7), and, at step S12, it connects the mobile unit (1) and the internal telephone (7) by means of "connection of public telephone networks with internal private circuit."

[0034] Fig. 5 illustrates the process that is executed when the processing method for a call received while the receiving side is busy is registered in advance for each dial-in number. At step S1, from the internal telephone (7) through the private branch exchange (6) or from



a maintenance console (not shown), the method for processing a call received while the receiving side is busy is registered in advance in the process-registration section (66) in correspondence with the dial-in number of the telephone (7). For example, either subjecting a call directly to the receiving-side-busy process, without implementing a callback, or carrying out a callback process is registered for each dial-in number. The registration is effected by a simple method utilizing special numbers, symbols, or codes.

[0035] At step S2, the control section (62) initializes the notification condition of the private branch exchange (6) in advance in such a way that the private branch exchange (6) informs the control section (62) when an incoming call is received while the internal telephone (7) is busy and when said internal telephone (7) becomes free after the call is finished. When, in this state, an incoming call from the mobile unit (1) is received by the internal telephone (7) that is busy, this satisfies the aforesaid notification condition, and the private branch exchange (6) transmits a notification of the incoming call to the control section (62) at step S3. At step S4, the control section (62) reads the processing method corresponding to the dial-in number of the telephone (7) from the process-registration section (66), and, at step S5, requests the private branch exchange (6) to carry out the corresponding process.

[0036] Fig. 5 (A) illustrates the process executed when the registered processing method is "to subject a call directly to the

receiving-side-busy process, without implementing a callback." In this case, the control section (62) requests, at step S5, the private branch exchange (6) to carry out the busy process. In response to this, the private branch exchange (6) outputs a busy signal to the mobile unit (1). Fig. 5 (B) illustrates the process executed when the registered processing method is to "callback." In this case, the control section (62) requests, at step S5, the private branch exchange (6) to make a connection. In response to this, the private branch exchange (6) connects the call from the mobile unit (1) to the callback processing section (61). The rest is the same as step S5 and those that follow in Fig. 3.

[0037] Fig. 6 illustrates the process that is executed when the processing method for a call to a specified internal telephone is registered in advance for each dial-in number. At step S1, from the internal telephone (7) through the private branch exchange (6) or from a maintenance console (not shown), the method for processing a call to a specified internal telephone (7) is registered in advance in the process-registration section (66) in correspondence with the dial-in number of the telephone (7). For example, either connecting a call directly to the internal telephone, without implementing a callback, or carrying out a callback process is registered for each dial-in number.

[0038] At step S2, the control section (62) initializes the notification condition of the private branch exchange (6) in advance

in such a way that, when an incoming call to a specified internal telephone (7) is received, the private branch exchange (6) informs the control section (6) to that effect unconditionally. When, in this state, an incoming call from the mobile unit (1) is received by the internal telephone (7), this satisfies the aforesaid notification condition, and the private branch exchange (6) transmits a notification of the incoming call to the control section (62) at step S3. At step S4, the control section (62) reads the processing method corresponding to the dial-in number of the telephone (7) from the process-registration section (66), and, at step S5, requests the private branch exchange (6) to carry out the corresponding process.

[0039] Fig. 6 (A) illustrates the process executed when the registered processing method is "to directly connect to the internal telephone, without implementing a callback." In this case, the control section (62) requests, at step S5, the private branch exchange (6) to carry out a connection process. In response to this, the private branch exchange (6) calls up the internal telephone (7) at step S6 and, upon receiving a response from the internal telephone (7), connects the call from the mobile unit (1) to the internal telephone (7) at step S7.

[0040] Fig. 6 (B) illustrates the process executed when the registered processing method is to "callback." In this case, the control section (62) requests, at step S5, the private branch exchange (6) to connect the call to the callback processing section (61). In

response to this, the private branch exchange (6) connects the call from the mobile unit (1) to the callback processing section (61) at step 8. The rest is the same as step S5 and those that follow in Fig. 3.

[0041] Fig. 7 illustrates the case in which, when a call from the mobile unit (1) is received while the receiving side is busy, the caller is requested to select the processing method for said call. The procedures of steps S1 through S6 are the same as those in Fig. 3. At step S7, the control section (62) activates the voice-generating section (67) to generate guidance that informs the caller that the receiving side is busy and that prompts the caller to input an instruction whether to terminate the call in response to the busy state of the receiving side or to call back as soon as the telephone (7) becomes available.

[0042] In response to this, the caller inputs the processing method from the mobile unit (1) by means of a PB signal at step S8. The processing method is input with a simple number or code. Upon receiving this signal, the control section (62) causes the PB-signal analyzing section (63) to analyze the aforesaid input processing method at step S9 and implements the process corresponding to the analysis result. Fig. 7 (A) illustrates the process for the case in which the input instruction is "to process a call directly in response to the busy state of the receiving side." In this case, the control section (62) requests, at step S10, the private branch exchange (6) /7

to carry out the busy process. In response to this, the private branch exchange (6) outputs a busy signal to the mobile unit (1).

[0043] Fig. 7 (B) illustrates the case in which the input instruction is to "call back as soon as the phone becomes available." In this case, the control section (62) activates, at step S11, the voice-generating section (67) to generate guidance that prompts the caller to terminate the call and wait. In this case, even if the guidance is not generated, the caller will eventually turn off the phone. Although not illustrated here, when the caller turns off the call button of the mobile unit (1), the call from the mobile unit (1) via the public network (3) is cut off.

[0044] Thereafter, when the call on the internal telephone (7) is completed, the private branch exchange (6) informs the control section (62) to this effect at step S12. At step S13, the control section (62) fetches the telephone number of the mobile unit (1) from the telephone-number memory section (64). The rest is the same as step S9 and those that follow in Fig. 3. Fig. 8 illustrates the case in which, when a specified internal telephone receives a call, the caller is requested to select the processing method.

[0045] The procedures of steps S1 through S6 are the same as those in Fig. 4. At step S7, the control section (62) activates the voice-generating section (67) to generate guidance that prompts the caller to input an instruction whether to connect to the internal telephone directly or to callback. In response to this, the caller

inputs the processing method from the mobile unit (1) by means of a PB signal at step S8. Upon receiving this signal, the control section (62) causes the PB-signal analyzing section (63) to analyze the aforesaid input processing method at step S9 and implements the process corresponding to the analysis result.

[0046] Fig. 8 (A) illustrates the process for the case in which the input instruction is "to connect directly to the internal telephone." In this case, the control section (62) requests, at step S10, the private branch exchange (6) to connect the call to the call-receiving telephone. The private branch exchange (6) calls up the call-receiving telephone (7) at step S11 and, upon receiving a response, connects the call from the mobile unit (1) directly to the internal telephone (7) at step S12.

[0047] Fig. 8 (B) illustrates the case in which the input instruction is to "callback " In this case, the control section (62) activates, at step S13, the voice-generating section (67) to generate guidance that prompts the caller to terminate the call and wait. For the same reason as described before, the generation of the guidance, may be omitted. In either case, when the caller turns off the call button of the mobile unit (1), the call from the mobile unit (1) via the public network (3) is cut off.

[0048] At step S14, the control section (62) fetches the caller number from the telephone-number memory section (64). The rest is the same as step S9 and those that follow in Fig. 4. Fig. 9 illustrates

the case in which, when a call from the mobile unit (1) is received while the receiving side is busy, the processing method for this call is automatically determined according to the position of the caller-side base station. The procedures of steps S1 through S5 are the same as those in Fig. 3.

[0049] At step S6, the control section (62) causes the positional-information analyzing section (65) to analyze the base station information provided from the base station (2) and carries out the process corresponding to the analysis result. Fig. 9 (A) illustrates the case in which the caller base station (2) is near the private branch exchange (6). In this case, making a call again from the mobile unit (1) does not incur a large calling charge; therefore, the call is processed in response to the busy state of the receiving side.

[0050] In this case, the control section (62) requests at step S7 the private branch exchange (6) to carry out a receiving-side-busy process. In response to this, the private branch exchange (6) outputs a busy signal to the mobile unit (1). Fig. 9 (B) illustrates the case in which the caller base station (2) is located far from the private branch exchange (6). In this case, making a call again from the mobile unit (1) incurs a large calling charge; therefore, a callback process, for example, is selected.

[0051] At step S11, the control section (62) activates the voice-generating section (67) to generate guidance that informs the mobile

unit (1) that the receiving side is busy and that prompts the caller to terminate the call and wait. Although not illustrated here, when the caller turns off the call button of the mobile unit (1), the call from the mobile unit (1) via the public network (3) is cut off. Thereafter, when the call on the internal telephone (7) is completed, the private branch exchange (6) informs the control section (62) to this effect at step S12. At step S13, the control section (62) fetches the telephone number of the mobile unit (1) from the telephone-number memory section (64). The rest is the same as step S9 and those that follow in Fig. 3.

[0052] With respect to the relationship between the location of the caller base station (2) and whether to carry out a callback process or not, various combinations are conceivable besides the cases presented in the foregoing. For example, even if the private branch exchange (6) is far from the caller base station (2), the call may be processed in response to the busy state of the receiving side when the fee schedule is inexpensive. On the other hand, even if they are close, a callback process is implemented when the fee schedule is expensive. Fig. 10 illustrates the case in which, when a specified internal telephone receives an incoming call, the processing method for this call is automatically determined according to the position of the caller-side base station.

[0053] The procedures of steps S1 through S5 are the same as those in Fig. 4. At step S6, the control section (62) causes the



positional-information analyzing section (65) to analyze the base station information provided from the base station (2) and carries out the process corresponding to the analysis result. Fig. 10 (A) illustrates the case in which the caller base station (2) is near the private branch exchange (6). In this case, connecting the call from the mobile unit (1) directly does not incur too much charge to the caller; therefore, the call is, for example, directly connected.

[0054] In this case, the control section requests, at step S7, the private branch exchange (6) to directly connect the call. In response to this, the private branch exchange (6) calls up the internal telephone (7) at step S8 and, upon receiving a response, connects the call from the mobile unit (1) to the internal telephone at step S9. Fig. 10 (B) illustrates the case in which the caller base station (2) is located far from the private branch exchange (6). In this case, connecting the call from the mobile unit (1) directly incurs a large calling charge to the caller; therefore, a callback process, for example, is selected.

[0055] In this case, the control section (62) activates, at step S10, the voice-generating section (67) to generate guidance that prompts the caller to terminate the call and wait. Although not illustrated here, when the caller turns off the call button of the mobile unit (1), the call from the mobile unit (1) via the public network (3) is cut off. Thereafter, the control section (62) fetches the caller number from the telephone-number memory section (64) at

step S11. The rest is the same as step S9 and those that follow in Fig. 4.

[0056] Fig. 11 illustrates the case in which, when a call from the mobile unit (1) is received while the receiving side is busy, the processing method for this call is automatically determined according to the telephone number of the mobile unit (1). The procedures of steps S1 through S5 are the same as those in Fig. 3. At step S6, the control section (62) causes the positional-information analyzing section (65) to analyze the base station information provided from the base station (2) and carries out the process corresponding to the analysis result of the telephone number of the mobile unit (1) from the telephone-number memory section (64).

[0057] Fig. 11 (A) illustrates the case in which the telephone number of the mobile unit (1) is not a pre-registered (pre-approved) telephone number. In this case, the control section (62) requests, at step S7, the private branch exchange (6) to carry out a receiving-side-busy process. In response to this, the private branch exchange (6) outputs a busy signal to the mobile unit (1). Fig. 11 (B) illustrates the case in which the telephone number of the mobile unit (1) is a pre-registered (pre-approved) telephone number. In this case, the control section (62) activates, at step S11, the voice-generating section (67) to generate guidance that prompts the caller to terminate the call and wait because the receiving side is busy. Although not illustrated here, when the caller turns off the call button of the

mobile unit (1), the call from the mobile unit (1) via the public network (3) is cut off.

[0058] Thereafter, when the call on the internal telephone (7) is completed, the private branch exchange (6) informs the control section (62) to this effect at step S12. At step S13, the control section (62) fetches the telephone number of the mobile unit (1) from the telephone-number memory section (64). The rest is the same as step S9 and those that follow in Fig. 3. Fig. 12 illustrates the case in which, when a specified internal telephone receives an incoming call, the processing method for this call is automatically determined according to the telephone number of the call-originating mobile unit (1).

[0059] The procedures of steps S1 through S5 are the same as those in Fig. 4. At step S6, the control section (62) causes the positional-information analyzing section (65) to analyze the base station information provided from the base station (2) and carries out the process corresponding to the analysis result of the telephone number of the mobile unit (1) from the telephone-number memory section (64). Fig. 12 (A) illustrates the case in which the telephone number of the mobile unit (1) is not a pre-registered (pre-approved) telephone number. In this case, the control section (62) requests, at step S7, the private branch exchange (6) to connect the call to the internal telephone (7). In response to this, the private branch exchange (6) calls up the internal telephone (7) at step S8 and, upon

receiving a response, connects the call from the mobile unit (1) to the internal telephone (7) at step S9.

[0060] Fig. 12 (B) illustrates the case in which the telephone number of the mobile unit (1) is a pre-registered (pre-approved) telephone number. In this case, the control section (62) activates, at step S10, the voice-generating section (67) to generate guidance that prompts the caller to terminate the call and wait. Although not illustrated here, when the caller turns off the call button of the mobile unit (1), the call from the mobile unit (1) via the public network (3) is cut off. Thereafter, the control section (62) fetches the caller number from the telephone-number memory section (64) at step S11. The rest is the same as step S9 and those that follow in Fig. 4.

[0061] Fig. 13 illustrates the case in which, when a call from the mobile unit (1) is received while the receiving side is busy, the caller is requested to provide his/her ID number. The procedures of steps S1 through S6 are the same as those in Fig. 3. At step S7, the control section (62) activates the voice-generating section (67) to generate guidance that informs the caller that the receiving side is busy and prompts the caller to input his/her ID number.

[0062] The caller inputs his/her own ID number by means of a PB signal at step S8. The control section (62) causes the ID-signal analyzing section (68) to analyze the ID number at step S9 and implements the process corresponding to the analysis result of the ID-

signal analyzing section (68). Fig. 13 (A) illustrates the case in which the ID number input by the caller is not pre-registered (pre-approved). In this case, the control section (62) requests at step S10 the private branch exchange (6) to carry out the busy process. In response to this, the private branch exchange (6) outputs a busy signal to the mobile unit (1). That is, the caller cannot receive the callback service.

[0063] Fig. 13 (B) illustrates the case in which the ID number input by the caller is pre-registered (pre-approved). In this case, the control section (62) activates, at step S11, the voice-generating section (67) to generate guidance that prompts the caller to terminate the call and wait. Although not illustrated here, when the caller turns off the call button of the mobile unit (1), the call from the mobile unit (1) via the public network (3) is cut off.

[0064] Thereafter, when the call on the internal telephone (7) is completed, the private branch exchange (6) informs the control section (62) to this effect at step S12. At step S13, the control section (62) fetches the caller number from the telephone-number memory section (64). That is to say, the caller can receive the callback service. The rest is the same as step S9 and those that follow in Fig. 3. Fig. 14 illustrates the case in which, when a specified internal telephone receives an incoming call, the caller is requested to provide his/her ID number.

[0065] The procedures of steps S1 through S6 are the same as those in Fig. 4. At step S7, the control section (62) activates the voice-generating section (67) to generate guidance that prompts the caller to input the ID number of the caller. The caller inputs his/her own ID number by means of a PB signal at step S8. The control section (62) causes the ID-signal analyzing section (68) to analyze the aforesaid input ID number at step S9 and implements the process corresponding to the analysis result of the ID-signal analyzing section (68).

[0066] Fig. 14 (A) illustrates the case in which the ID number input by the caller is not pre-registered (pre-approved). In this case, the control section (62) requests, at step S10, the private branch exchange (6) to connect the call to the call-receiving telephone (7). In response to this, the private branch exchange (6) calls up the internal telephone (7) at step S11 and, upon receiving a response, /9 connects the call from the mobile unit (1) to the internal telephone (7) at step S12. That is to say, the caller cannot receive the callback service.

[0067] Fig. 14 (B) illustrates the case in which the ID number input by the caller is pre-registered (pre-approved). In this case, the control section (62) activates, at step S13, the voice-generating section (67) to generate guidance that prompts the caller to terminate the call and wait. Although not illustrated here, when the caller turns off the call button of the mobile unit (1), the call from the

mobile unit (1) via the public network (3) is cut off. Thereafter, the control section (62) fetches the caller number from the telephone-number memory section (64) at step S14. That is to say, the caller can receive the callback service. The rest is the same as step S9 and those that follow in Fig. 4.

[0068] Fig. 15 illustrates the case in which, when a call is received from the mobile unit (1), the telephone number of the mobile unit cannot be obtained from the public network. The following explains the process for the case in which the receiving side is not busy, but the process for the case in which the receiving side is busy can be readily inferred from the process illustrated in Fig. 3 that was discussed earlier. The procedures of steps S1 through S4 are the same as those in Fig. 4.

[0069] At step S5, the control section (62) causes the positional-information analyzing section (65) to analyze the base-station information provided from of the caller-side base station (2). At step S6, the control section (62) activates the voice-generating section (67) to generate guidance that prompts the caller to input the telephone number of the mobile unit (1). At step S7, the caller inputs the telephone number of the mobile unit (1) from the mobile unit (1) by means of a PB signal. At step S8, the control section (62) causes the telephone-number memory section (64) to store the telephone number decoded by the PB-signal analyzing section (63). The procedures of

step S9 and those that follow are the same as the case illustrated in Fig. 4.

[0070] Fig. 16 illustrates the case in which, when a call is received from the mobile unit (1), the positional information of the base station (2) cannot be obtained from the network side. The following explains the process implemented when the receiving side is not busy, but the process for the case in which the receiving side is busy can be readily inferred from the process illustrated in Fig. 3 that was discussed earlier. The procedures of steps S1 through S4 are the same as those in Fig. 4.

[0071] At step S5, the telephone number of the mobile unit (1) is stored in the telephone-number memory section (64). At step S6, the control section (62) activates the voice-generating section (67) to generate guidance that prompts the caller to input the positional information of the mobile unit (1). The positional information that the caller can input here includes the address information (state, city, town, village, telephone number, etc.), coded data thereof, or the prefix information of the call-originating location.

[0072] At step S7, the caller inputs the positional information of the mobile unit (1) from the mobile unit (1) by means of a PB signal, and, at step S8, the control section (62) causes the positional-information analyzing section (65) to analyze the positional information decoded by the PB-signal analyzing section (63). The procedures of step S9 and those that follow are the same as the



case in Fig. 4. Fig. 17 illustrates the case in which the mobile unit (1) is equipped with a positioning means, such as a GPS (Global Positioning System), etc. For example, if an automobile is equipped with a navigation system that utilizes a GPS, its positional information can be used for an in-vehicle telephone unit.

[0073] The following explains the process implemented when the receiving side is not busy, but the process for the case in which the receiving side is busy can be readily inferred from the process illustrated in Fig. 3 that was discussed earlier. The procedures of steps S1 through S5 are the same as those in Fig. 16. At step S6, the control section (62) activates the voice-generating section (67) to generate guidance that prompts the caller to input the positional information of the mobile unit (1).

[0072] At step S7, from the mobile unit (1), the caller inputs by means of a PB signal his/her positional information, which is obtained by driving a GPS unit installed in or connected to the mobile unit (1). At step S8, the control section (62) causes the positional-information analyzing section (65) to analyze the positional information decoded by the PB-signal analyzing section (63). The procedures of step S9 and those that follow are the same as the case in Fig. 16.

[0075] For each of the aforesaid embodiments, the process executed when the receiving side is busy and the process executed when a specified internal telephone receives an incoming call are explained separately, but these cases can be put together and processed. Fig. 18

illustrates the process for this case. Fig. 18 (A) presents an example of the process-registration section (66), and, under the dial-in-number column, the dial-in numbers of the telephones that connect to all the internal lines of the private branch exchange (6) are recorded. Under the callback flag (CBF) column, the presence (CBF=1) or absence (CBF=0) of a callback is recorded. These can be set from each internal telephone or a maintenance console.

[0076] In this case, a telephone with CBF=0 can be said to be a normal internal telephone, and a telephone with CBF=1 can be said to be a specified internal telephone. Fig. 18 (B) illustrates an example of the callback process executed by utilizing the process-registration section (66) shown in Fig. 18 (A). At step S1, the system determines if the internal telephone that has received a call is set to CBF=1 or not. If it is set to CBF=1 (a specified telephone), the system determines if the receiving side is busy (BSY) or not at step S2. If the receiving side is busy, the system waits for the completion of the call at step S3, and, when the call is over, the system performs the callback process at step S4. If the receiving side is not found to be busy at step S2, the system performs the callback process at step S4.

[0077] When the telephone is found at the aforesaid step S1 to be set to CBF=0 (a common telephone), the system further determines at step S5 if the receiving side is busy (BSY) or not. If the receiving side is found to be busy, the system carries out the busy process (transmission of a busy sound) at step S6. If the receiving side is

not busy, the system connects the call from the mobile unit (1) directly at step S7. The aforesaid embodiments have presented the cases of adding the callback processing section (61) to a conventional private branch exchange (6). This makes it possible to implement the communication service according to the present invention simply by adding the callback processing section (61) to an existing /10 private branch exchange (6); thus, the existing equipment can be utilized. However, it is evident that the functions pertaining to the present invention can be integrated into the private branch exchange (6) proper.

[0078] Furthermore, various preferred embodiments of the present invention have been presented, but it goes without saying that, within the scope of the present invention, the configuration, control, and combination of these can be changed in various ways.

[0079] [Effects of the Invention]

As explained in the foregoing, the present invention makes it possible to call back a dial-in incoming call received from a mobile unit. Furthermore, the present invention determines the private branch exchange nearest to the caller-side base station and calls back via this private branch exchange; therefore, it becomes possible to reduce the calling fee charged to the private branch exchange.

[Brief Explanation of the Drawings]

[Fig. 1] Fig. 1 is a drawing for explaining the principle of the present invention.

[Fig. 2] Fig. 2 is a drawing illustrating the configuration of the callback processing system according to an embodiment.

[Fig. 3] Fig. 3 is a drawing (1) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 4] Fig. 4 is a drawing (2) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 5] Fig. 5 is a drawing (3) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 6] Fig. 6 is a drawing (4) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 7] Fig. 7 is a drawing (5) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 8] Fig. 8 is a drawing (6) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 9] Fig. 9 is a drawing (7) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 10] Fig. 10 is a drawing (8) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 11] Fig. 11 is a drawing (9) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 12] Fig. 12 is a drawing (10) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 13] Fig. 13 is a drawing (11) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 14] Fig. 14 is a drawing (12) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 15] Fig. 15 is a drawing (13) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 16] Fig. 16 is a drawing (14) illustrating the sequence of the callback processing system according to an embodiment.

[Fig. 17] Fig. 17 is a drawing (15) illustrating the sequence of the callback processing system according to an embodiment.

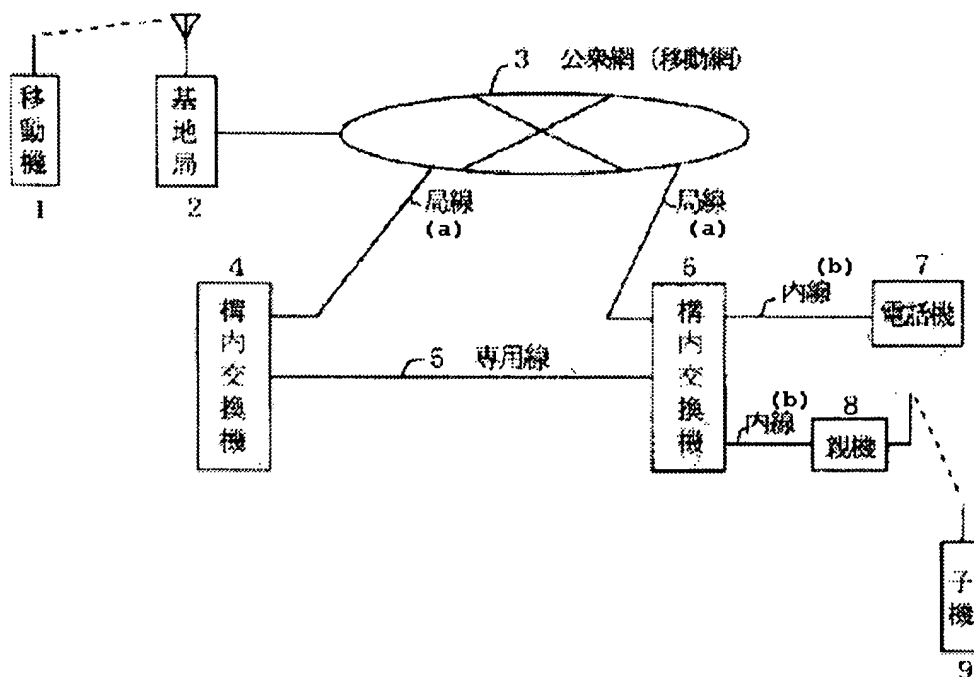
[Fig. 18] Fig. 18 is a drawing (16) illustrating the sequence of the callback processing system according to an embodiment.

[Explanation of Reference Numerals]

- 1 mobile unit
- 2 base station
- 3 public network
- 4,6 private branch exchange
- 5 lease line
- 7 internal telephone

[FIG. 1]

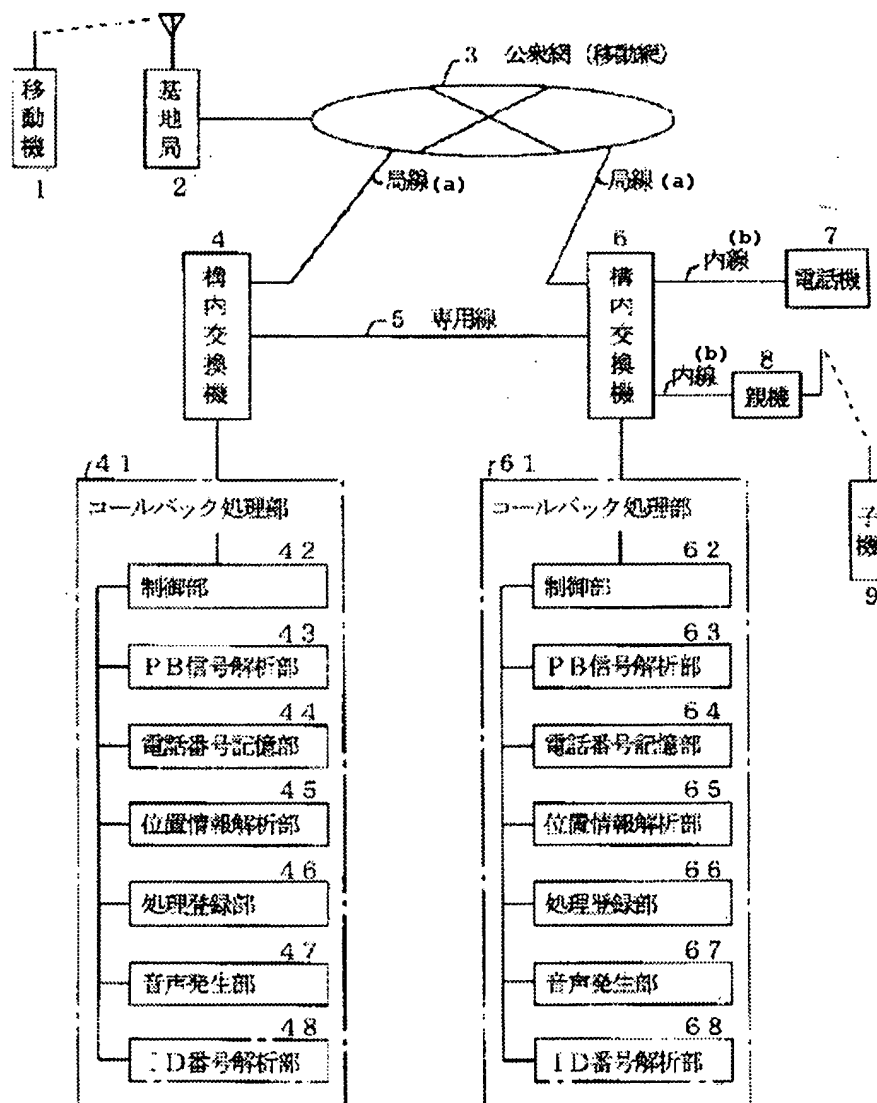
DRAWING FOR EXPLAINING THE PRINCIPLE OF THE PRESENT INVENTION



Key: 1) mobile unit; 2) base station; 3) public network (mobile network); 4, 6) private branch exchange; 5) lease line; 7) telephone; 8) master unit; 9) slave unit; a) main wire; b) extension.

[FIG. 2]

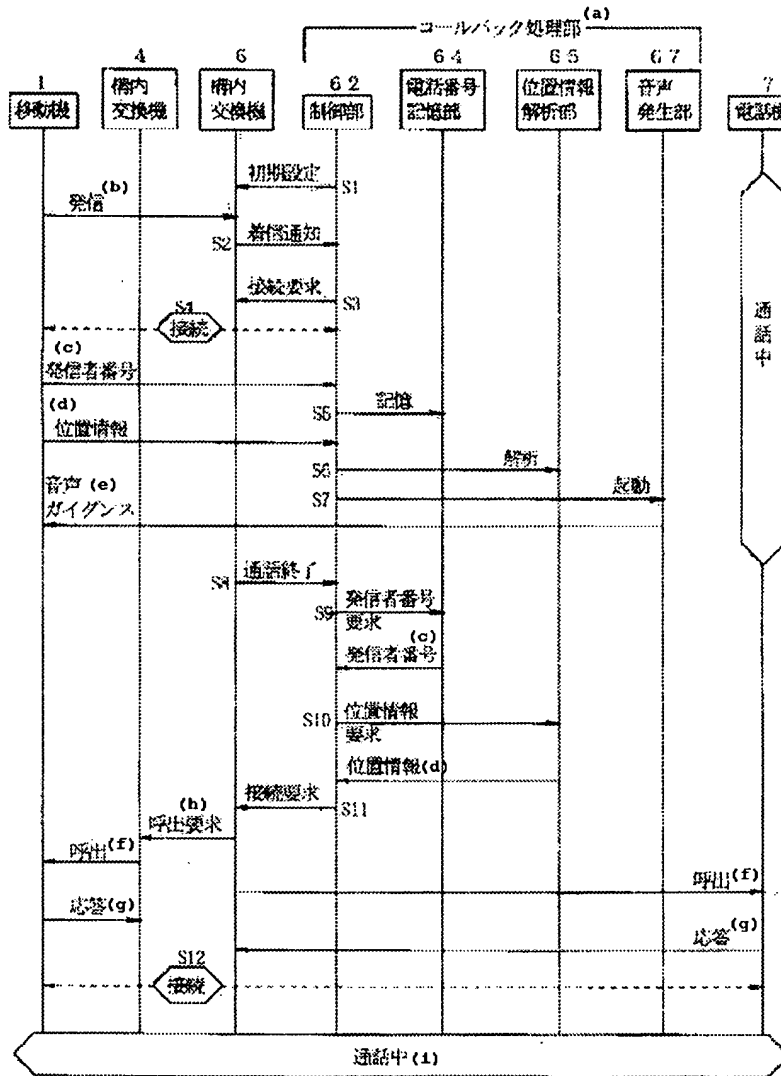
DRAWING ILLUSTRATING THE CONFIGURATION OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



Key: 1) mobile unit; 2) base station; 3) public network (mobile network); 4, 6) private branch exchange; 5) lease line; 7) telephone; 8) master unit; 9) slave unit; 41, 61) callback processing section; 42, 62) control section; 43, 63) PB-signal analyzing section; 44, 64) telephone-number memory section; 45, 65) positional-information analyzing section; 46, 66) process-registration section; 47, 67) voice-generating section; 48, 68) ID-number analyzing section; a) main wire; b) extension.

[FIG. 3]

DRAWING (1) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT

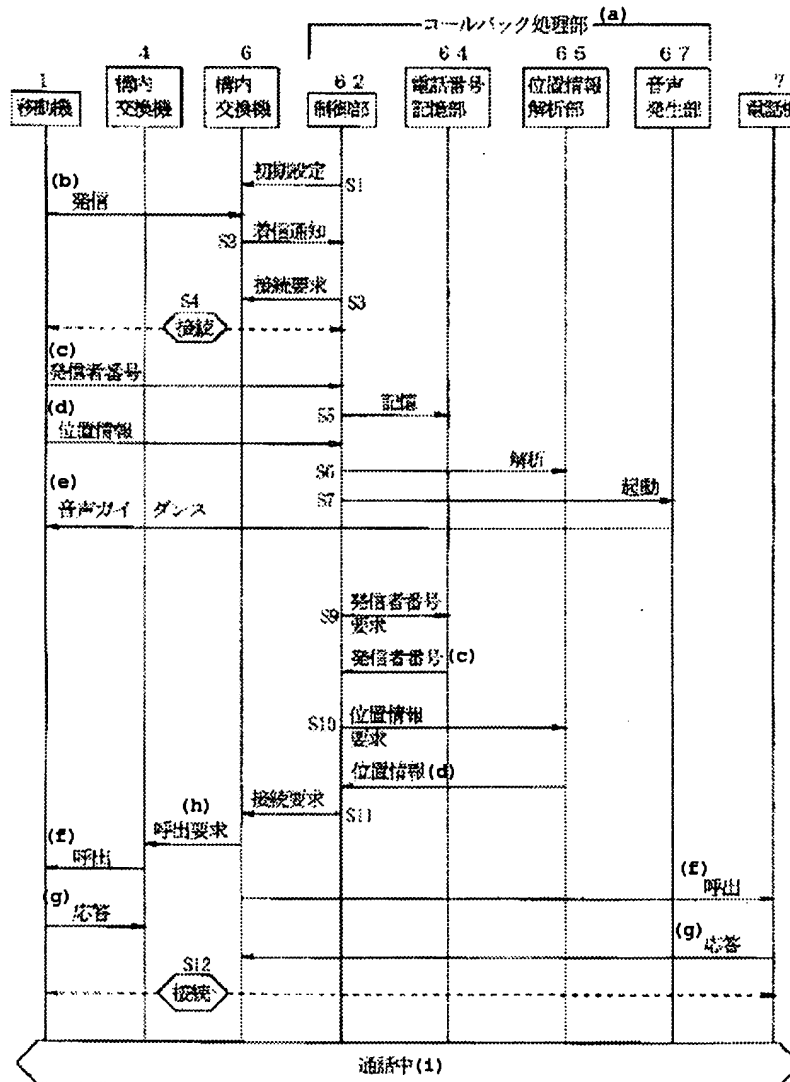


Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize; S6) analyze; S7) activate; S8) the call is finished; S9) call number request; S10) positional information request; S11) connection request; S12) connect; a) callback processing section; b) a call is originated; c) caller number; d) positional information; e) voice guidance; f) call up; g) response h) call-up request; i) busy.



[FIG. 4]

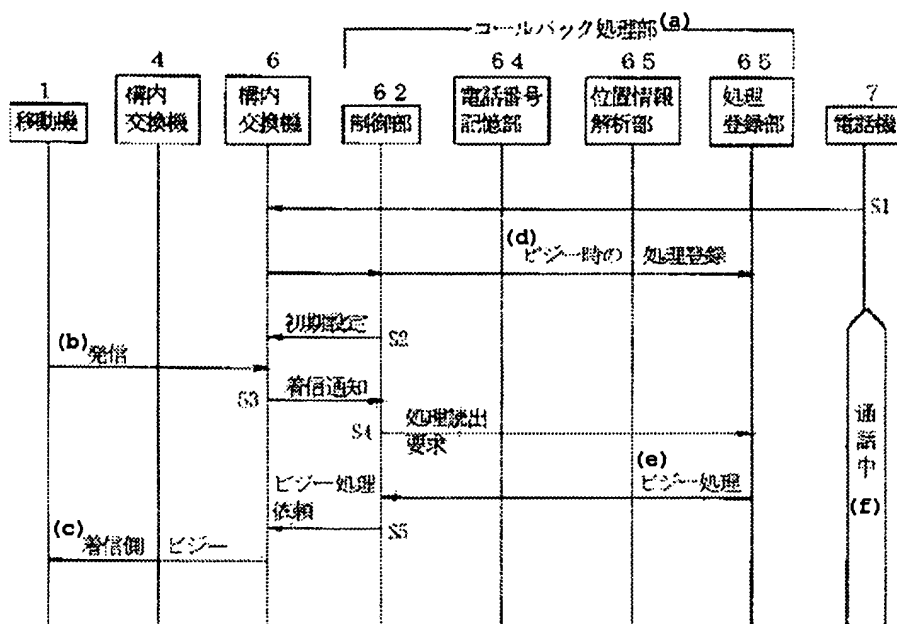
DRAWING (2) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



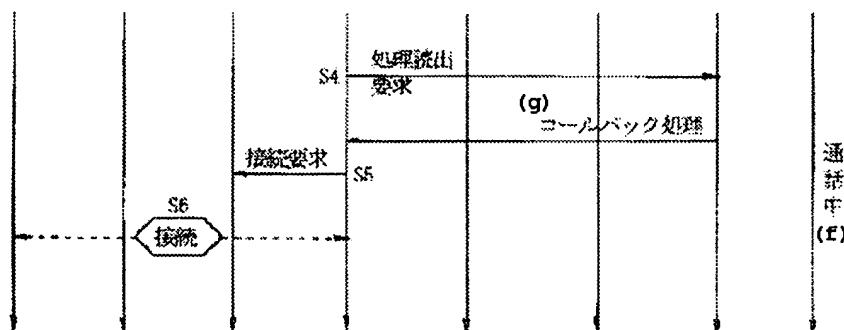
Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize; S6) analyze; S7) activate; S9) call number request; S10) positional information request; S11) connection request; S12) connect; a) callback processing section; b) a call is originated; c) caller number; d) positional information; e) voice guidance; f) call up; g) response h) call-up request; i) busy.

[FIG. 5]

## DRAWING (3) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



(A)

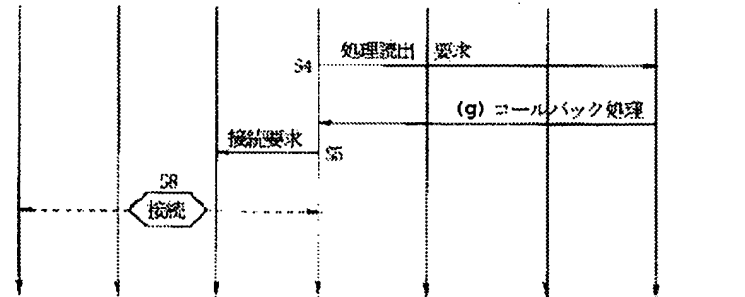
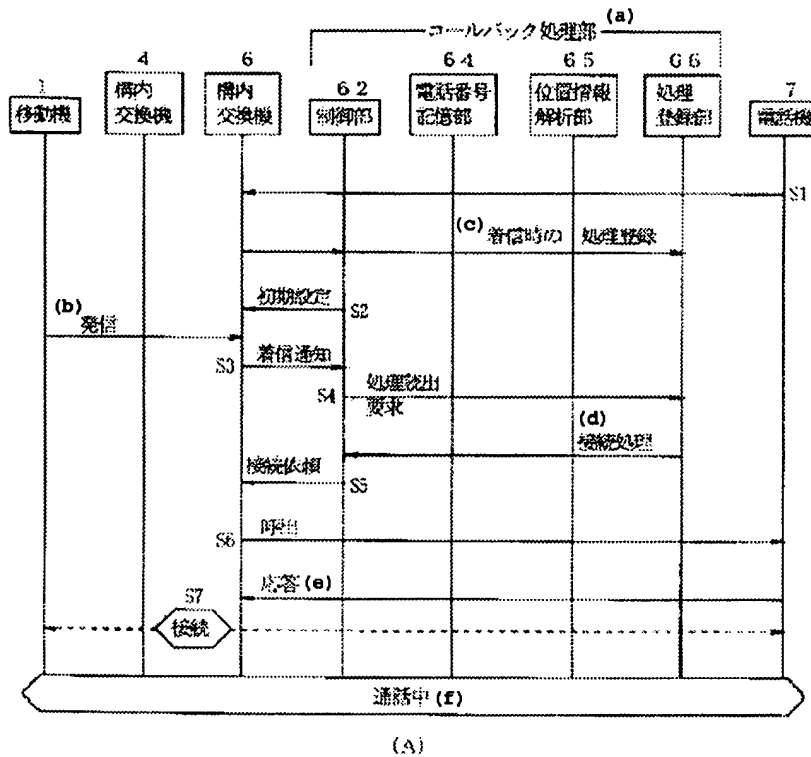


(B)

Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 64) telephone-number memory section; 65) positional-information analyzing section; 66) process-registration section; S2) initial setup; S3) incoming call notification; S4) process fetching request; S5 in A) busy process request; S5 in B) connection request; S6) connect; a) callback processing section; b) a call is originated; c) the receiving side is busy; d) registration of the processing method used when busy; e) the busy process; f) busy; g) callback processing.

[FIG. 6]

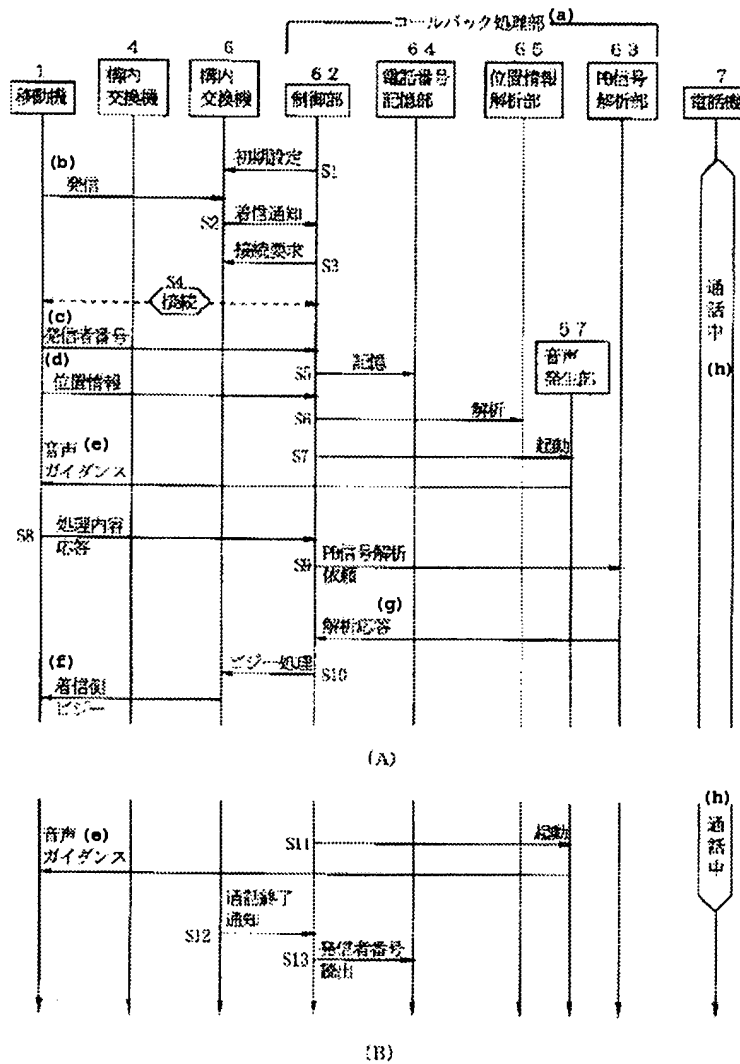
DRAWING (4) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 64) telephone-number memory section; 65) positional-information analyzing section; 66) process-registration section; S2) initial setup; S3) incoming call notification; S4) process fetching request; S5) connection request; S6) call up; S7, S8) connect; a) callback processing section; b) a call is originated; c) registration of the processing method used when receiving an incoming call; d) connection process; e) response; f) busy; g) callback processing.

[FIG. 7]

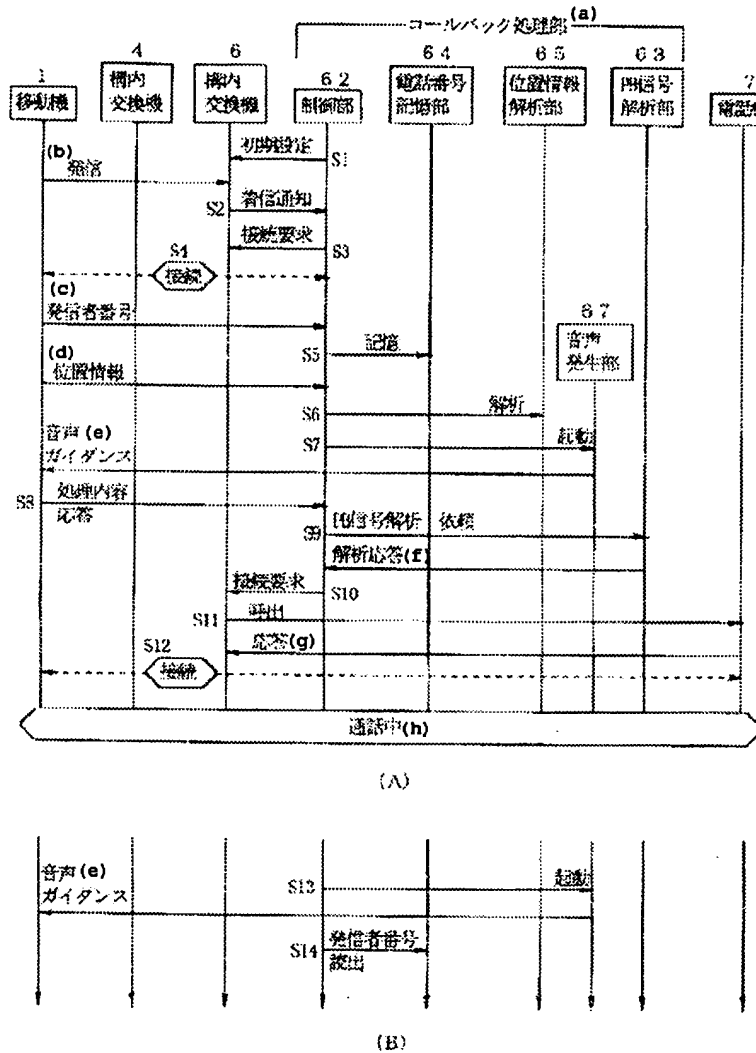
## DRAWING (5) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 63) PB-signal analyzing section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize; S6) analyze; S7) activate; S8) processing method response; S9) PB-signal analysis request; S10) the busy process; S11) activate; S12) notification of end of the call; S13) read the caller number; a) callback processing section; b) a call is originated; c) the caller number; d) positional information; e) voice guidance; f) receiving side is busy; g) analysis response; h) busy.

[FIG. 8]

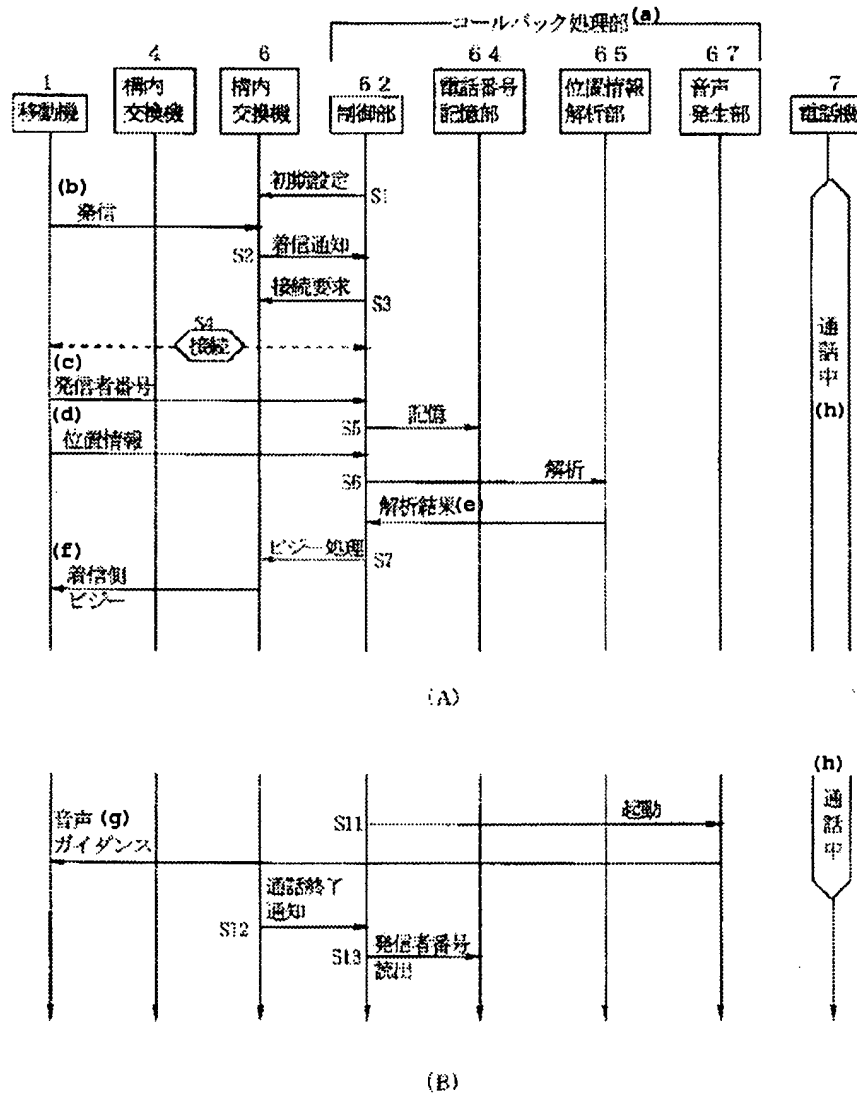
DRAWING (6) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 63) PB-signal analyzing section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize; S6) analyze; S7) activate; S8) processing method response; S9) PB-signal analysis request; S10) connection request; S11) call up; S12) connect; S13) activate; S14) read the caller number; a) callback processing section; b) a call is originated; c) the caller number; d) positional information; e) voice guidance; f) analysis response; g) response; h) busy.

[FIG. 9]

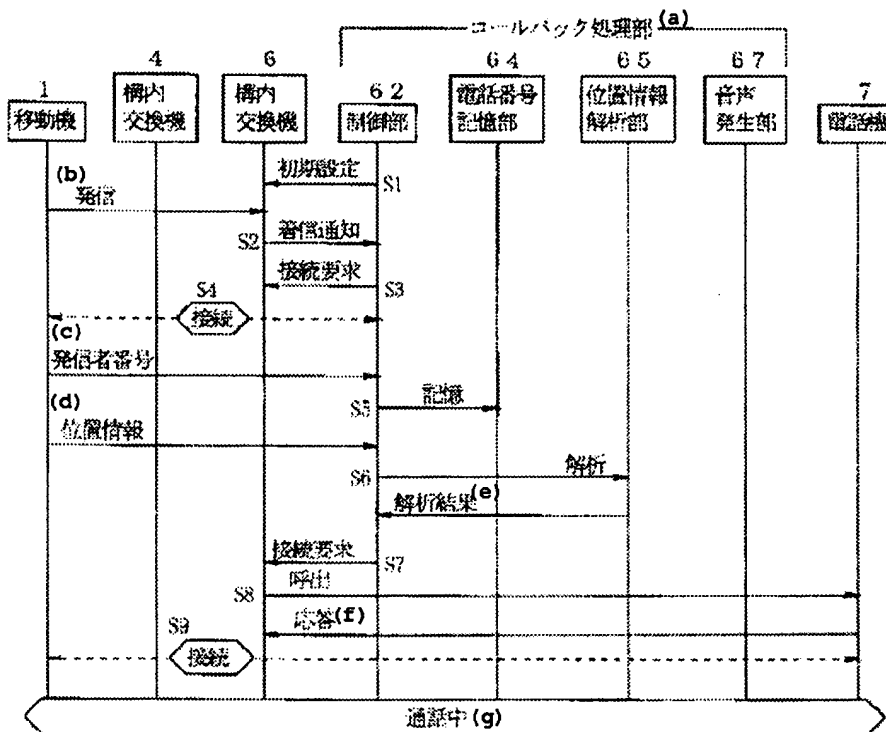
DRAWING (7) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



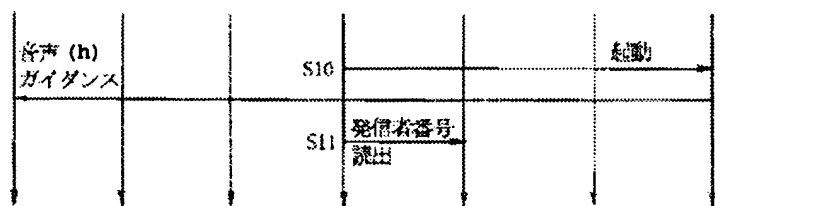
Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize; S6) analyze; S7) the busy process; S11) activate; S12) notification of end of the call; S13) read the caller number; a) callback processing section; b) a call is originated; c) the caller number; d) positional information; e) analysis result; f) receiving side is busy; g) voice guidance; h) busy.

[FIG. 10]

DRAWING (8) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



(A)

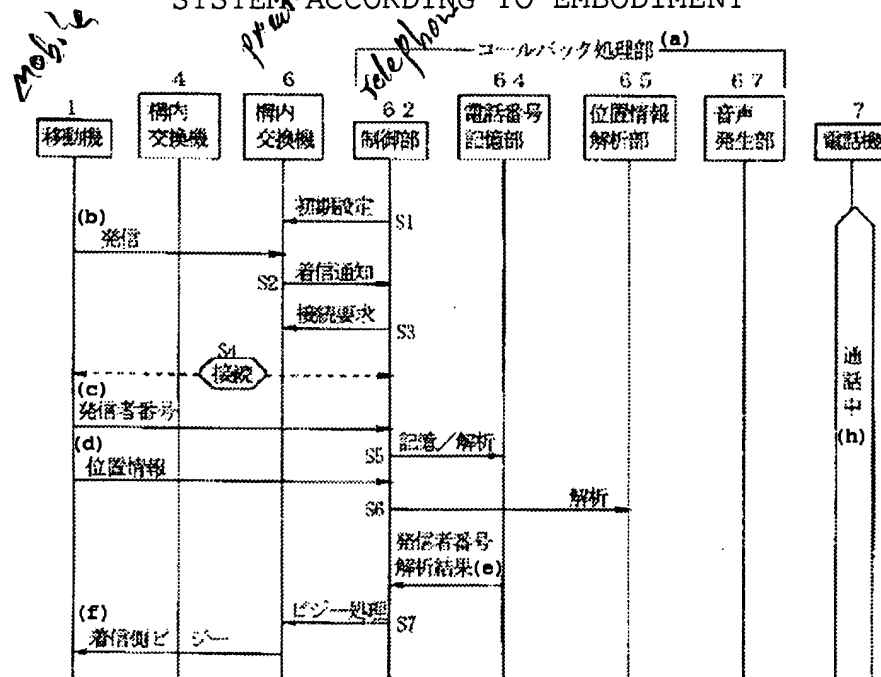


(B)

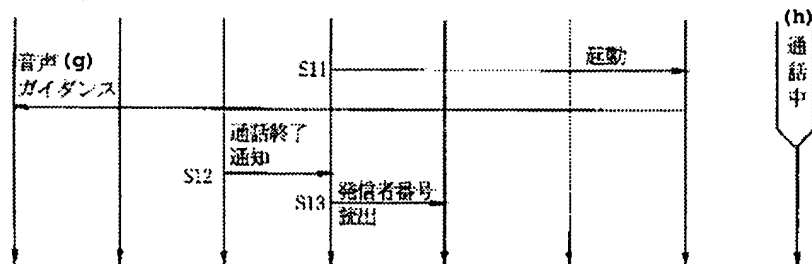
Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize; S6) analyze; S7) connection request; S8) call up; S9) connect; S10) activate; S11) read the caller number; a) callback processing section; b) a call is originated; c) the caller number; d) positional information; e) analysis result; f) response; g) busy; h) voice guidance.

[FIG. 11]

DRAWING (9) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



(A)



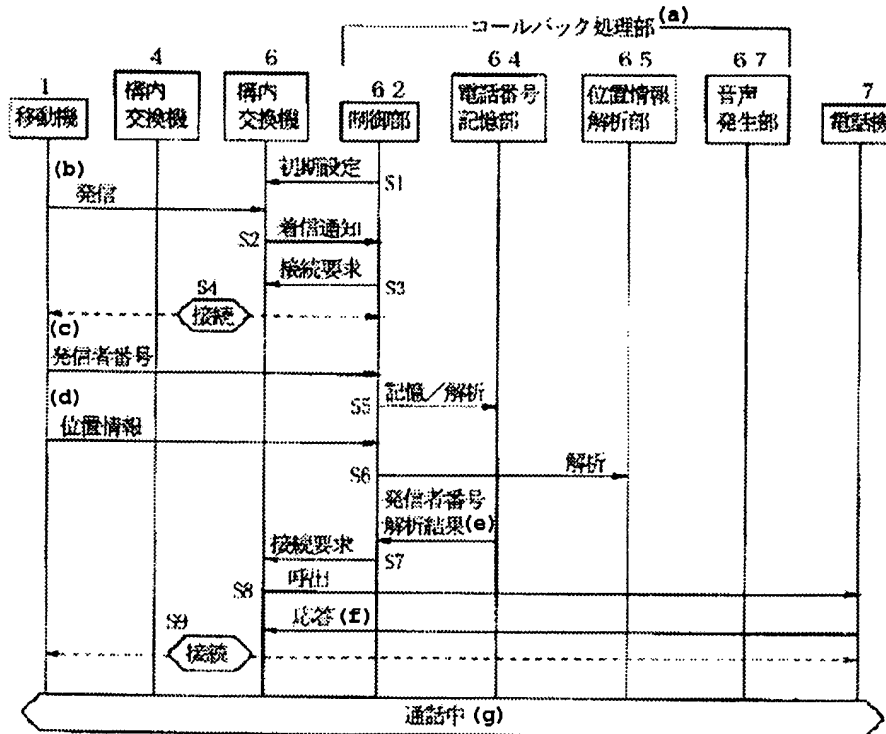
(B)

Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize/analyze; S6) analyze; S7) the busy process; S11) activate; S12) notification of end of the call; S13) read the caller number; a) callback processing section; b) a call is originated; c) the caller number; d) positional information; e) analysis result of the call number; f) receiving side is busy; g) voice guidance; h) busy.

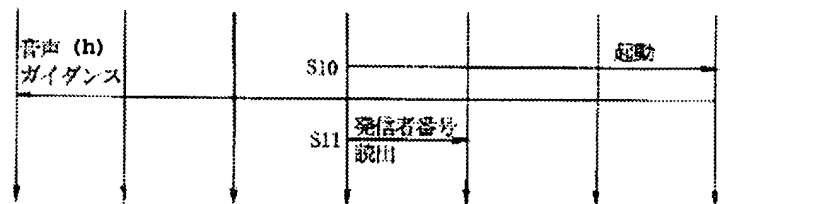


[FIG. 12]

DRAWING (10) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



(A)

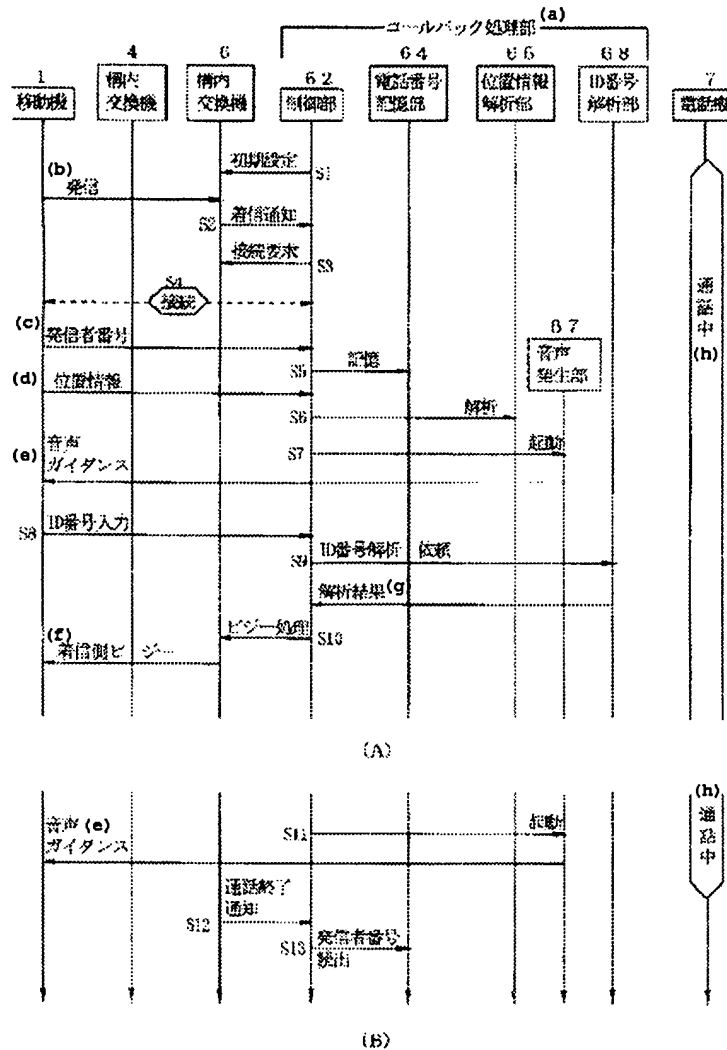


(B)

Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize/analyze; S6) analyze; S7) connection request; S8) call up; S9) connect; S10) activate; S11) read the caller number; a) callback processing section; b) a call is originated; c) the caller number; d) positional information; e) analysis result of the caller number; f) response; g) busy; h) voice guidance.

[FIG. 13]

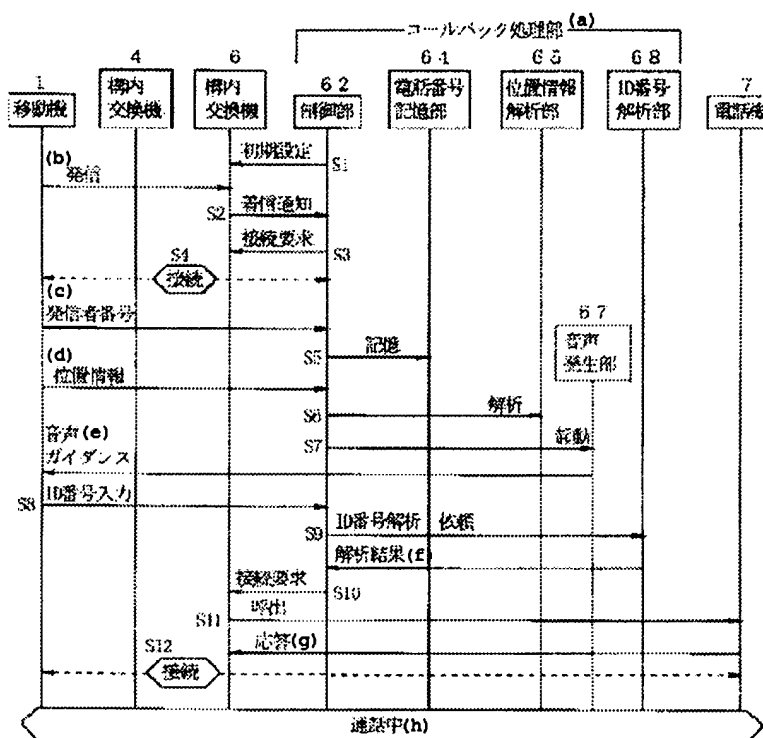
## DRAWING (11) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



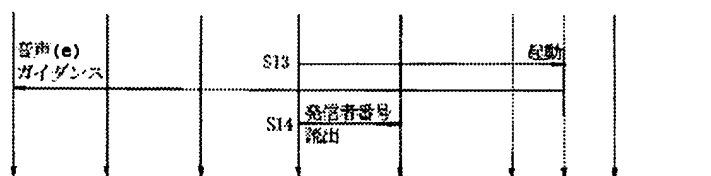
Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; 68) ID-number analyzing section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize; S6) analyze; S7) activate; S8) ID-number input; S9) ID-number analysis request; S10) the busy process; S11) activate; S12) notification of end of the call; S13) read the caller number; a) callback processing section; b) a call is originated; c) the caller number; d) positional information; e) voice guidance; f) receiving side is busy; g) analysis result; h) busy.

[FIG. 14]

DRAWING (12) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



(A)

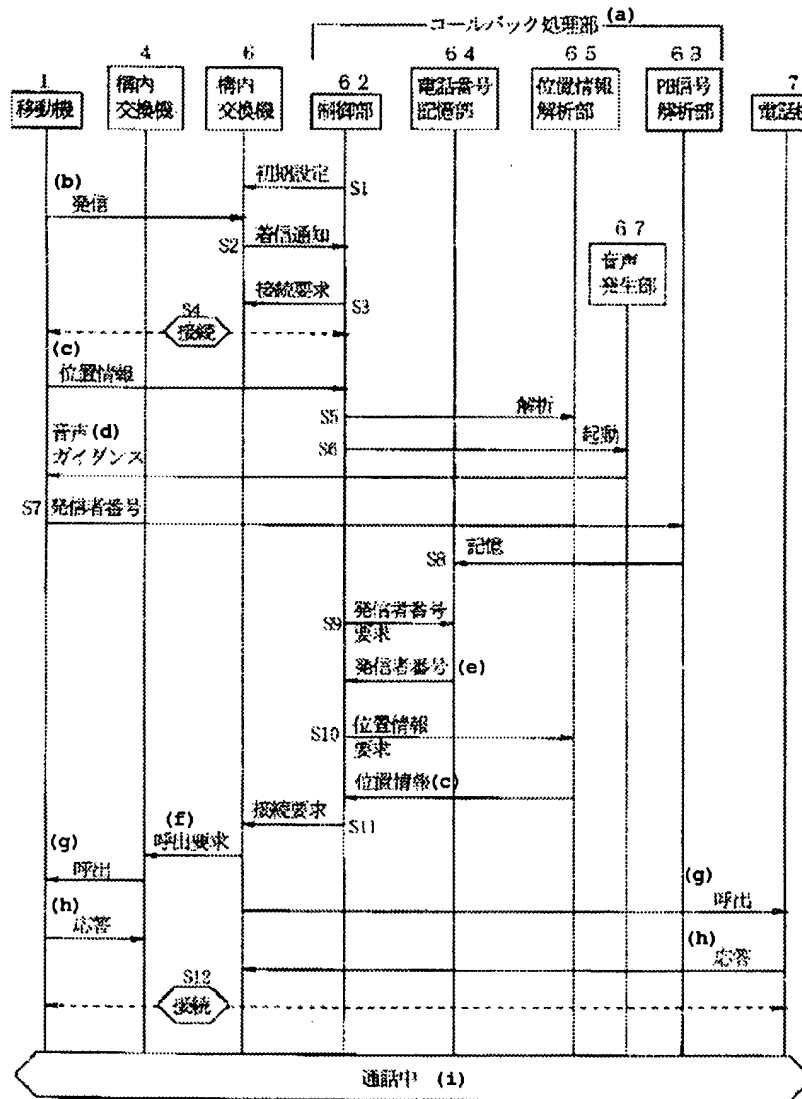


(B)

Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; 68) ID-number analyzing section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize; S6) analyze; S7) activate; S8) ID-number input; S9) ID-number analysis request; S10) connection request; S11) call up; S12) connect; S13) activate; S14) read the caller number; a) callback processing section; b) a call is originated; c) the caller number; d) positional information; e) voice guidance; f) analysis result; g) response; h) busy.

[FIG. 15]

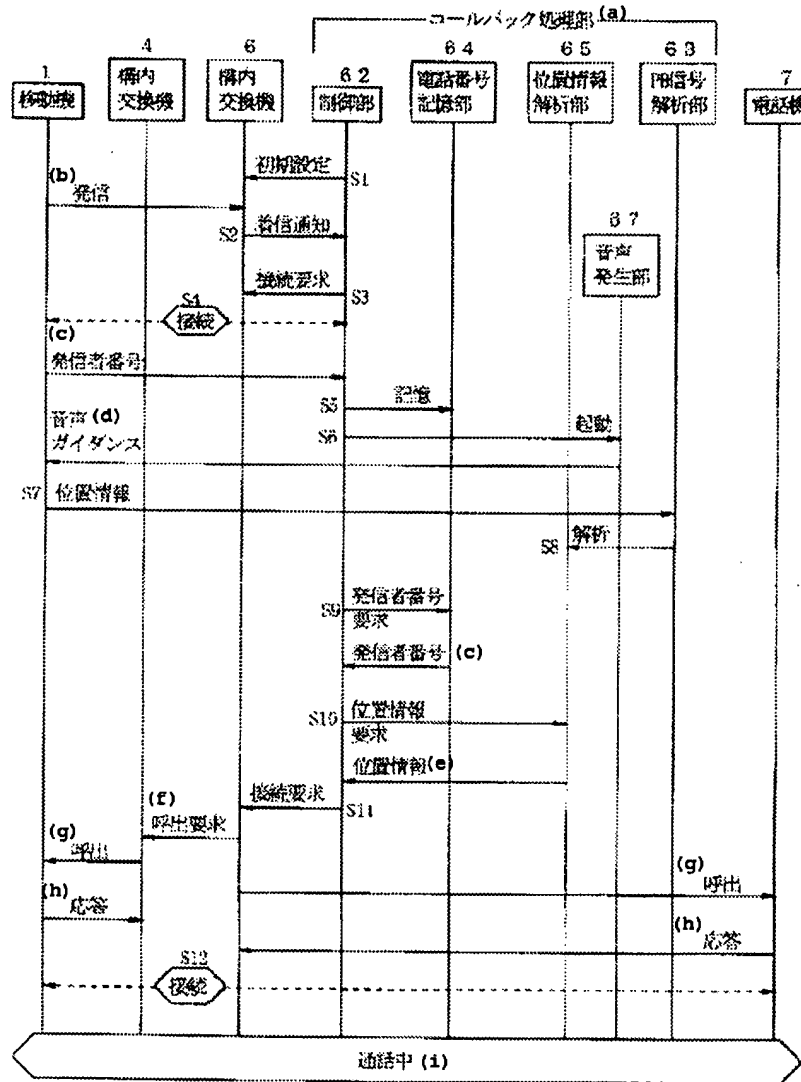
DRAWING (13) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 63) PB-signal analyzing section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) analyze; S6) activate; S7) the caller number; S8) memorize; S9) caller number request; S10) positional information request; S11) connection request; S12) connect; a) callback processing section; b) a call is originated; c) positional information; d) voice guidance; e) the caller number; f) call-up request; g) call up; h) response; i) busy.

[FIG. 16]

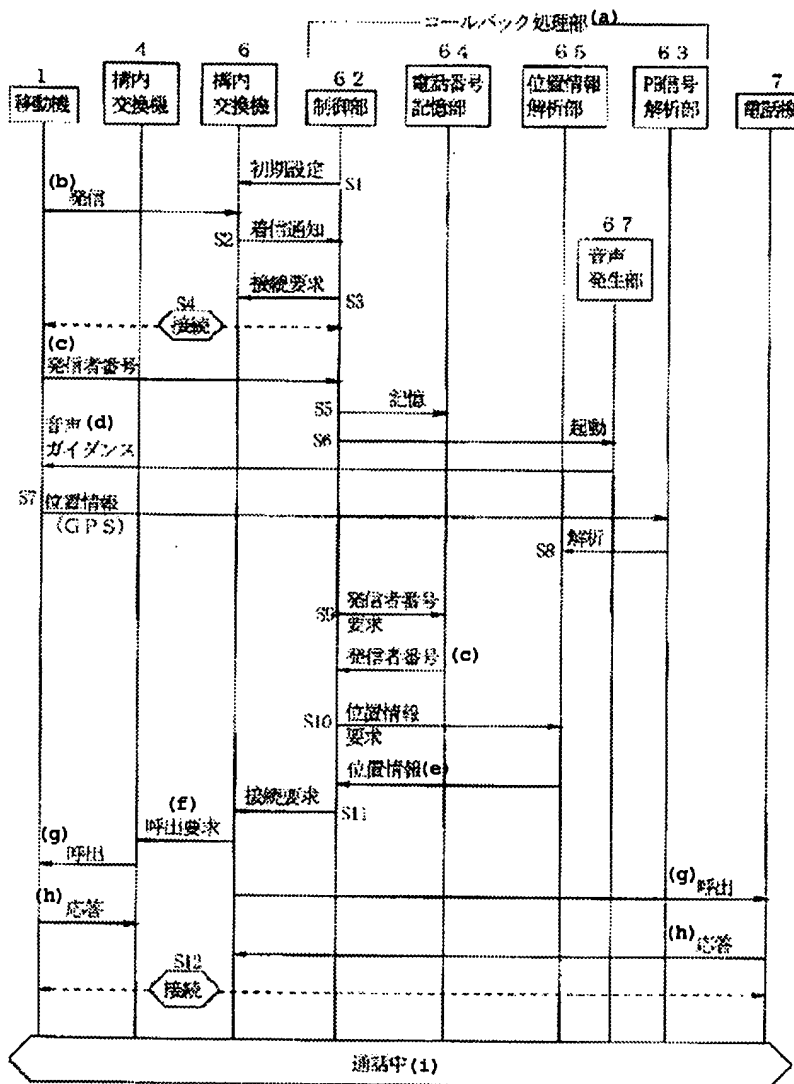
DRAWING (14) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 63) PB-signal analyzing section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize; S6) activate; S7) positional information; S8) analyze; S9) caller number request; S10) positional information request; S11) connection request; S12) connect; a) callback processing section; b) a call is originated; c) the caller number; d) voice guidance; e) the positional information; f) call-up request; g) call up; h) response; i) busy.

[FIG. 17]

DRAWING (15) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT



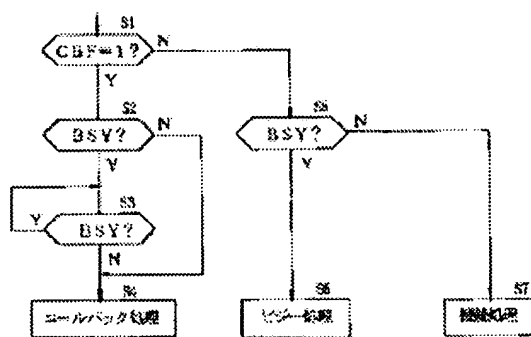
Key: 1) mobile unit; 4, 6) private branch exchange; 7) telephone; 62) control section; 63) PB-signal analyzing section; 64) telephone-number memory section; 65) positional-information analyzing section; 67) voice-generating section; S1) initial setup; S2) incoming call notification; S3) connection request; S4) connect; S5) memorize; S6) activate; S7) positional information (GPS); S8) analyze; S9) caller number request; S10) positional information request; S11) connection request; S12) connect; a) callback processing section; b) a call is originated; c) the caller number; d) voice guidance; e) the positional information; f) call-up request; g) call up; h) response; i) busy.

[FIG. 18]

DRAWING (16) ILLUSTRATING THE SEQUENCE OF THE CALLBACK PROCESSING SYSTEM ACCORDING TO EMBODIMENT

(a)	(b)
ダイヤルイン番号	コールバックフラグ
001	0
002	1
003	1
004	0
n	0

(A)



(B)

Key: a) dial-in number; b) callback flag; S4) callback processing; S6) the busy process; S7) the connection process.